Patent Abstracts

These Patent Abstracts of recently issued patents are intended to provide the minimum information necessary for readers to determine if they are interested in examining the patent in more detail. Complete copies of patents are available for a small fee by writing: U.S. Patent and Trademark Office, Box 9, Washington, DC 20231 USA.

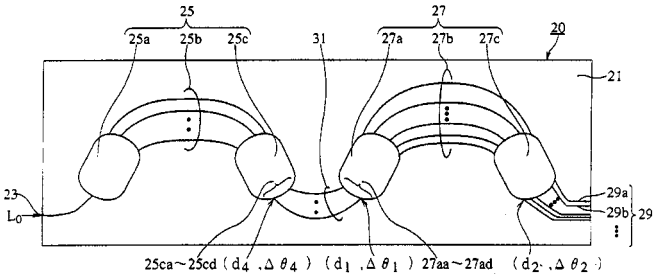
6,272,270 Aug. 7, 2001

Optical Wave Combining/Splitting Device

Inventor: Hideaki Okayama.
Assignee: Oki Electric Industry Co., Ltd.
Filed: June 17, 1998.

***Abstract*—**The present invention expands a selective wavelength band and flattens light intensity in the selective wavelength band as good as or better than prior art, and makes power loss less than prior art. The invention as a period characteristic wavelength splitter and an arrayed waveguide diffraction grating wavelength splitter between the first input/output port and the second input/output port in this sequence. The period characteristic wavelength splitter is comprised of the third star coupler, the second arrayed waveguide comprised of multiple waveguides having different optical path lengths, and the fourth star coupler. When an optical signal is input from the first input/output port, the period characteristic wavelength splitter outputs optical signals which wavelengths sequentially deviated with difference δ from multiple ports at the first star coupler side of the fourth star coupler. The optical signals which can be output from the multiple ports are all periodic optical signals with waveform difference $\Delta\lambda$ for any one of the ports.

10 Claims, 6 Drawing Sheets



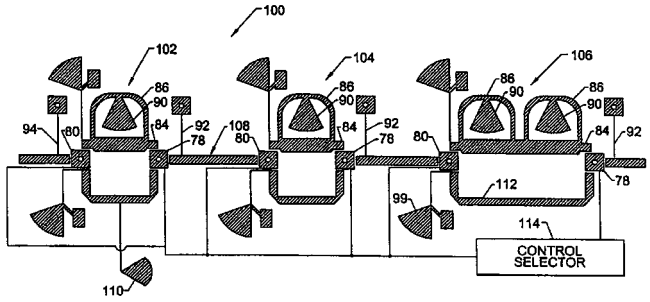
6,275,120 Aug. 14, 2001

Microstrip Phase Shifter Having Phase Shift Filter Device

Inventors: Roy Vaninetti, Gregory Marquardt, and Christopher Gregorean.
Assignee: Harris Corporation.
Filed: Feb. 17, 2000.

***Abstract*—**A broad band phase shifter of the present invention can be used in a microstrip conductor and includes a power divider disposed along a microstrip conductor. The power divider has first and second outputs. A reference transmission line is disposed on the microstrip conductor and connected to the first output of the power divider. A phase shift filter device is disposed on the microstrip conductor and connected to the second output of the power divider. The phase shift filter device comprises a 180 degree phase shift coupled line structure formed of a first substantially linear 90 degree phase shift parallel line section, and a second substantially linear 90 degree phase shift parallel line section coupled to the first parallel line section. The first and second 90 degree phase shift parallel line sections have parallel lines that are spaced about five mils apart. The first and second 90 degree phase shift parallel line sections also have parallel lines that are offset to each other.

3 Claims, 9 Drawing Sheets



6,275,121 Aug. 14, 2001

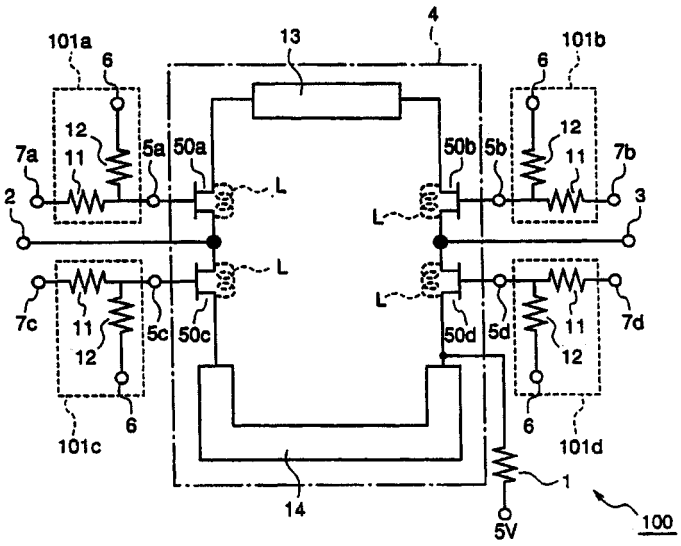
Microwave Circuit for Phase Shifting Having Voltage Transforming Means to Control Switching

Inventors: Yoshinobu Sasaki, Yasuharu Nakajima, and Takaya Maruyama.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: Feb. 27, 1998.

***Abstract*—**A microwave phase shifter includes bias regulating circuits generating a gate bias of an FET switch element by processing a control voltage generated by the power-source voltage of an external system and applied to the FET switch element in a transformation process. The off-level of the gate bias is set near the pinch-off voltage. As a result, even when the control voltage of the FET switch element which switches the phase shift amount is restricted due to the circumstance of the system power-source, the off-level of the FET element can be set at a potential near the pinch-off voltage and can suppress delay in the rise of the phase shifter output because the off-level exceeds the pinch-off voltage.

Publisher Item Identifier S 1531-1309(02)02558-8.

10 Claims, 12 Drawing Sheets



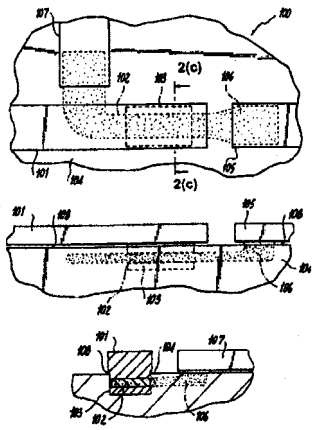
6,275,122 Aug. 14, 2001

Encapsulated MEMS Band-Pass Filter for Integrated Circuits

Inventors: James L. Speidell and James F. Ziegler.
Assignee: International Business Machines Corporation.
Filed: Aug. 17, 1999.

***Abstract*—**Integrated circuit fabrication technique for constructing novel MEMS devices, specifically band-pass filter resonators, in a manner compatible with current integrated circuit processing, and completely encapsulated to optimize performance and eliminate environmental corrosion. The final devices may be constructed of single-crystal silicon, eliminating the mechanical problems associated with using polycrystalline or amorphous materials. However, other materials may be used for the resonator. The final MEMS device lies below the substrate surface, enabling further processing of the integrated circuit, without protruding structures. The MEMS device is about the size of a SRAM cell, and may be easily incorporated into existing integrated circuit chips. The natural frequency of the device may be altered with post-processing or electronically controlled using voltages and currents compatible with integrated circuits.

15 Claims, 8 Drawing Sheets



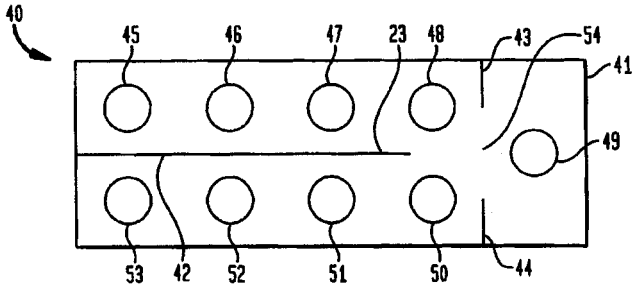
6,275,124 Aug. 14, 2001

Delay Line Filter Having a Single Cross-Coupled Pair of Elements

Inventor: Joseph Patrick Mendelsohn.
Assignee: Lucent Technologies Inc.
Filed: Jan. 19, 2000.

***Abstract*—**A method and apparatus for implementing a delay line filter with a single cross-coupled pair of filter elements. In a first exemplary embodiment of the present invention, the filter is comprised of a plurality of symmetrically configured filter elements, wherein only two of the filter elements are cross-coupled. In a second exemplary embodiment of the present invention, the filter is comprised of a plurality of filter elements, wherein a first element is coupled to a second element, and the first and second elements are each coupled to at least two other elements and at least one of the at least two other elements for each of the first and second elements are the same.

15 Claims, 3 Drawing Sheets



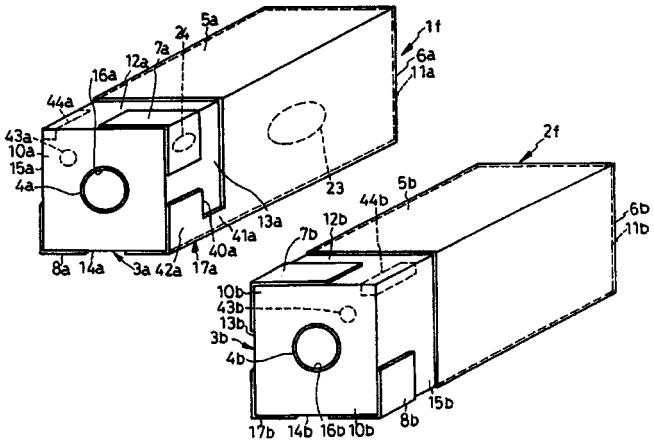
6,275,125 Aug. 14, 2001

Wave Filter Having Two or More Coaxial Dielectric Resonators in Juxtaposition

Inventors: Kenji Takei, Hisahiro Yasuda, Kazuhisa Sato, Makoto Inoue, Takeshi Kosaka, Kenji Yoshimori, and Masao Igarashi.
Assignee: Taiyo Yuden Co., Ltd.
Filed: Feb. 15, 2000.

***Abstract*—**A radio frequency filter having at least two dielectric resonators in juxtaposition, each resonator including a tubular dielectric body. Formed on the dielectric body of each resonator are an inner and an outer conductors and various other conductors including a terminal conductor for connection of the filter to external circuitry. In order to assure positive isolation of the terminal conductors of both resonators from each other, the outer conductors are provided with extensions which intervene between the terminal conductors for preventing then from being capacitively coupled together.

6 Claims, 22 Drawing Sheets



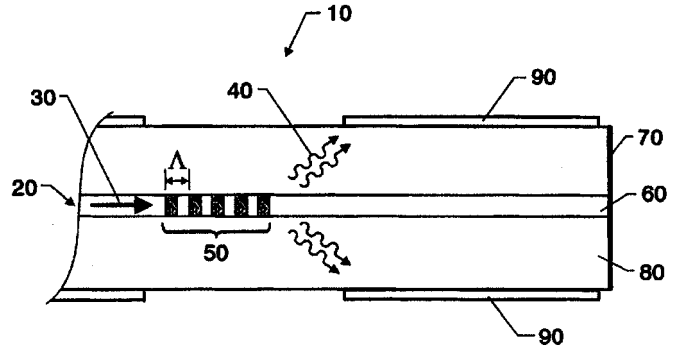
6,275,628 Aug. 14, 2001

Single-Ended Long Period Grating Optical Device

Inventors: Mark E. Jones, Kent A. Murphy, Jennifer L. Elster, Michael F. Gunther, and Thomas A. Wavering.
Assignee: Luna Innovations, Inc.
Filed: Nov. 15, 1999.

***Abstract*—**A single-ended long period grating optical device is presented. The single-ended optical device comprises an optical waveguide having at least one core mode and a plurality of cladding modes. At least one long period grating couples light from the core mode to the cladding modes. A reflector is positioned in an operable relationship to the long period grating, and the reflector reflects a signal. A mode stripper is positioned after the long period grating and removes the cladding modes from a transmitted signal and the reflected signal.

49 Claims, 7 Drawing Sheets



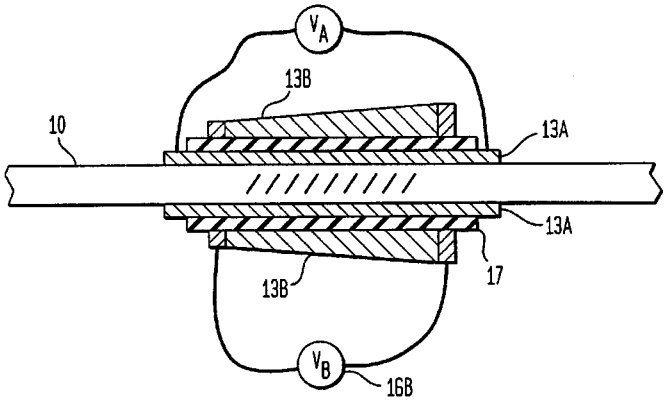
6,275,629 Aug. 14, 2001

Optical Grating Devices With Adjustable Chirp

Inventors: Benjamin John Eggleton, John A. Rogers, and Thomas Andrew Strasser.
Assignee: Lucent Technologies Inc.
Filed: Oct. 30, 1998.

***Abstract*—**In accordance with the invention, an optical waveguide grating with adjustable chirp comprises a waveguide grating in thermal contact with an electrically controllable heat-transducing body which varies the temperature along the length of the grating. The heat-transducing body can generate heat on the fiber or remove heat from the fiber to establish a temperature gradient along the grating. In an exemplary embodiment, the heat-transducing body is a resistive film coating whose local resistance varies along the length of the grating. Electrical current passed through the film generates a temperature gradient along the grating approximately proportional to the local resistance of the film, and the amount of chirp can be adjusted by the current. The resulting devices are simple, compact and power efficient.

12 Claims, 8 Drawing Sheets



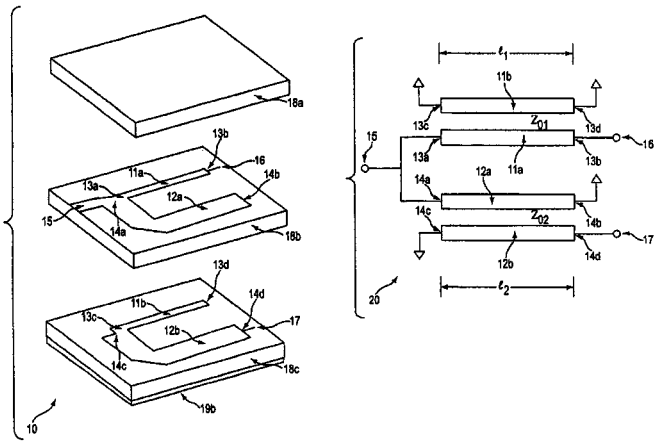
6,278,340 Aug. 21, 2001

Miniaturized Broadband Balun Transformer Having Broadside Coupled Lines

Inventor: Shih-Ping Liu.
Assignee: Industrial Technology Research Institute.
Filed: May 11, 1999.

***Abstract*—**A miniaturized wideband Balun circuit is disclosed which includes a first dielectric substrate having substantially planar opposing surfaces; first and second conducting strips disposed on a first one of the opposing surfaces of the first dielectric substrate and each having a first terminal and a second terminal; a second dielectric substrate having substantially planar opposing surfaces, with a first one of the opposing surfaces of the second dielectric substrate being disposed over the first and second conducting strips; third and fourth conducting strips disposed on a second one of the opposing surfaces of the second dielectric layer and each having a first terminal and a second terminal The first and second conducting strips overlie the third and fourth conducting strips, respectively. The first and second terminals of the first conducting strip, the first terminal of the second conducting strip and the second terminal of the fourth conducting strip are electrically grounded. The first terminal of the third and fourth conducting strips are connected to an unbalanced port. The second terminal of the third conducting strip is connected to a first balanced port, and the second terminal of the second conducting strip is connected to a second balanced port.

13 Claims, 4 Drawing Sheets



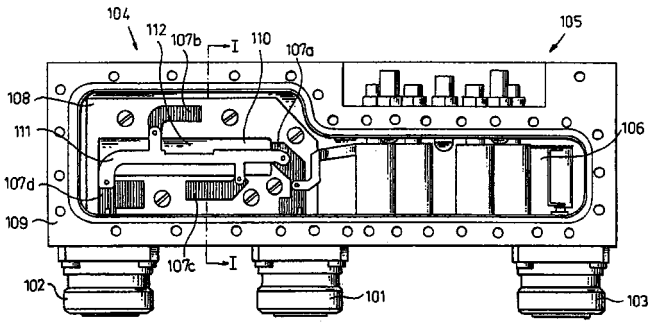
6,278,341 Aug. 21, 2001

Microstrip Filter Device

Inventor: Leif Lindqvist.
Assignee: Allgon AB.
Filed: June 17, 1999.

***Abstract*—**The present invention provides a filter for achieving a small, low cost filter means for high-power applications. This is achieved by providing a filter comprising a first and a second signal port **101**, **102** arranged to pass signals of said first frequency band and at least a first ground plane means. The filter further comprising an elongated conductor, **111**, coextending substantially in parallel with the ground plane means providing a first signal path for said frequency band between the first and second ports, at least a first conductive segment, **107**, having first radio frequency characteristics and being connected to the signal path at a first interconnection point and where the first characteristics and the position of the first interconnection point being selected such that radio frequencies outside the first frequency band are effectively attenuated in the first signal path. The filter being characterized in that the elongated conductor and the conductive segment being formed partly by a planar dielectric material, having a relative dielectric constant substantially greater than one, provided with a conductive pattern and partly by a self supporting conductor, the first interconnection point and the ground plane means being separated by a dielectric in the form of a gas.

11 Claims, 4 Drawing Sheets



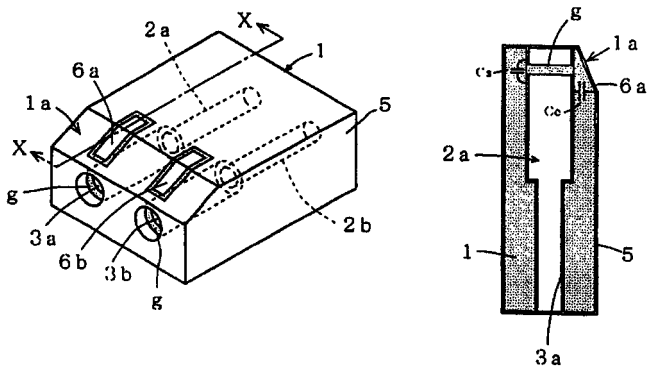
6,278,343 Aug. 21, 2001

Dielectric Filter, Dielectric Duplexer, and Communication Apparatus

Inventors: Takahiro Okada, Jinsei Ishihara, and Hideyuki Kato.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Oct. 19, 1999.

***Abstract*—**A dielectric filter, a dielectric duplexer, and a communication apparatus are able to obtain a desired external coupling without adversely affecting the Qo, and are inexpensive and have excellent characteristics. A ridgeline between an open-side end surface and a mounting surface of a dielectric block is removed to form a slope, and input/output electrodes are provided extending from near the open-side end surface of the slope and crossing to the mounting surface, the input/output electrodes being isolated from a ground conductor.

7 Claims, 7 Drawing Sheets



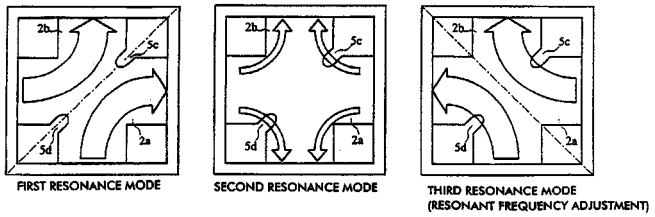
6,278,344 Aug. 21, 2001

Multiple-Mode Dielectric Resonator and Method of Adjusting Characteristic of the Resonator

Inventors: Toru Kurisu and Shin Abe.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Apr. 17, 2000.

***Abstract*—**A multiple-mode dielectric resonator in which a combined dielectric block formed of a plurality of dielectric elements combined into a crossed shape is used to cause three resonance modes along a plane defined by two of the dielectric elements, and in which the resonant frequency of each mode is determined, or a multiple-mode dielectric resonator in which the degree of coupling between predetermined resonance modes is determined. If first and third resonance modes are two TM110 modes having different lines of symmetry of electric field distributions, and if a second mode is a TM111 mode, dielectric-cut portions are formed in the combined dielectric block, for example, at positions where the electric field distribution of the first resonance mode is concentrated while the electric field distributions of the second and third resonance modes are not concentrated, thereby selectively determining the resonant frequency of the first resonance mode.

2 Claims, 23 Drawing Sheets



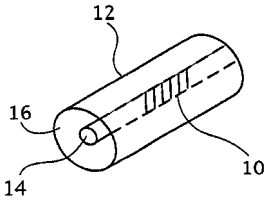
6,278,817 Aug. 21, 2001

Asymmetric Low Dispersion Bragg Grating Filter

Inventor: Liang Dong.
Assignee: Corning, Incorporated.
Filed: Aug. 31, 1999.

***Abstract*—**A Bragg grating filter is provided for use in an optical fiber of an optical fiber system. The optical fiber includes a core and a cladding. A plurality of Bragg grating segments are formed into the core of the optical fiber. Each grating element is defined by periodic variations in the refractive index. The period variations in the refractive index have a spatially asymmetric index of modulation, such that dispersion of the reflection at one end of the grating element can be decreased at the expense of increased dispersion of reflection at the other end of the grating element.

11 Claims, 9 Drawing Sheets



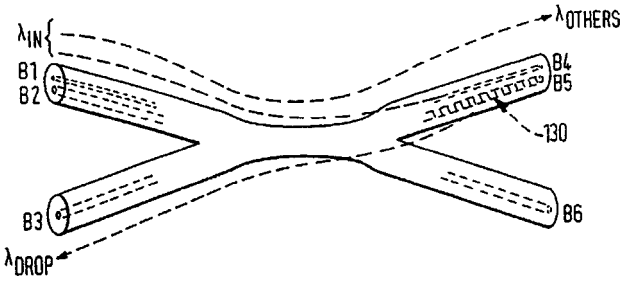
6,278,818 Aug. 21, 2001

Optical Coupler and/or Multiplexer

Inventors: Richard Ian Laming and Liang Dong.
Assignee: University of Southampton.
Filed: Apr. 20, 1998.

***Abstract*—**An optical fiber coupler has at least an m-core optical fiber optically coupled to an n-core optical fiber, where m and n are positive integers and m is greater than 1. A channel add/drop multiplexer includes an optical fiber coupler and a Bragg grating disposed on the m-core fiber outside the coupling region.

24 Claims, 4 Drawing Sheets



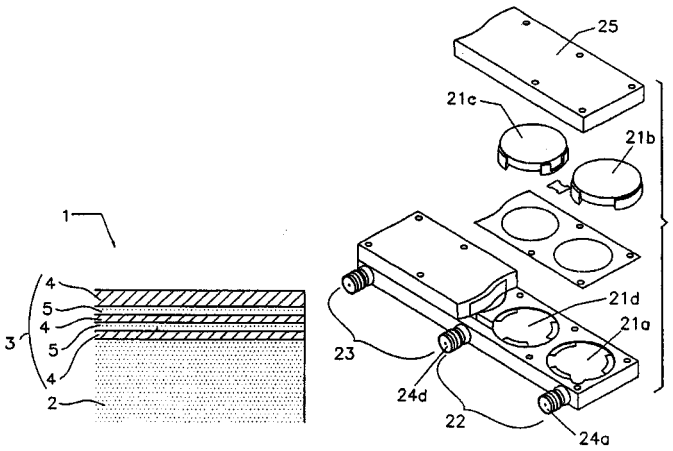
6,281,763 Aug. 28, 2001

Dielectric Resonator, Dielectric Filter, Dielectric Duplexer, and Method for Manufacturing Dielectric Resonator

Inventors: Yohei Ishikawa, Seiji Hidaka, Norifumi Matsui, and Tomoyuki Ise.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Jan. 20, 1998.

***Abstract*—**A dielectric resonator comprises electrodes formed on both the main surfaces of a dielectric substrate and a thin film multi-layer electrode of thin film conductor layers and thin film dielectric layers having fixed thickness alternately laminated which constitutes at least one of the electrodes, and is characterized in that by giving abrasive treatment or etching treatment to the external portion of the dielectric substrate and the external portion of the electrodes formed on both the main surfaces of the dielectric substrate the end portions of the electrode is made in an electrically open-circuited condition. In this way, a dielectric resonator making effective use of the characteristic of low loss of the thin film multi-layer electrode is presented.

12 Claims, 5 Drawing Sheets



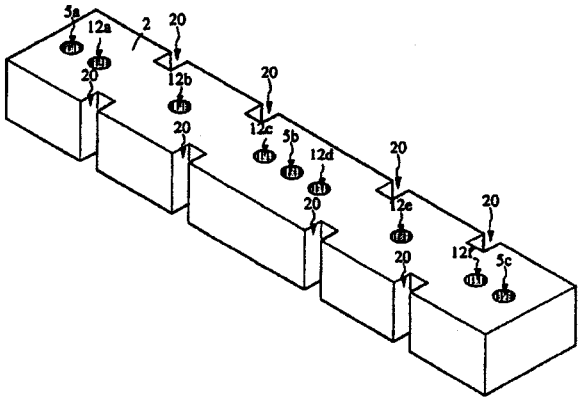
6,281,764 Aug. 28, 2001

Dielectric Waveguide Resonator, Dielectric Waveguide Filter, and Method of Adjusting the Characteristics Thereof

Inventors: Shigeji Arakawa and Kikuo Tsunoda.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Dec. 4, 2000.

***Abstract*—**A dielectric duplexer or multiplexer in which a conducting film is formed on a dielectric block in a dielectric waveguide resonator, and a through-hole is formed in the dielectric block. The unloaded Q is set by selecting the outside dimensions of the dielectric block. The resonance frequency is set by selecting the size and location of the through-hole as well as the outside dimensions of the dielectric block. A terminal electrode is formed on the outer surface of the dielectric block. A coupling hole is formed in the dielectric block and a coupling electrode is formed on the inner surface of the coupling hole. One end of the coupling electrode is connected to the terminal electrode and the other end of the coupling electrode is either connected to the conducting film formed on the outer surface of the dielectric block or terminated inside the dielectric block. The above structure allows an increase in the degree of freedom in the design of the characteristics including the resonance frequency and unloaded Q of the dielectric waveguide resonator. The invention also provides a dielectric waveguide filter with a simple coupling mechanism whereby it is possible to couple to an external circuit without having to use an additional member and without electromagnetic leakage.

18 Claims, 21 Drawing Sheets



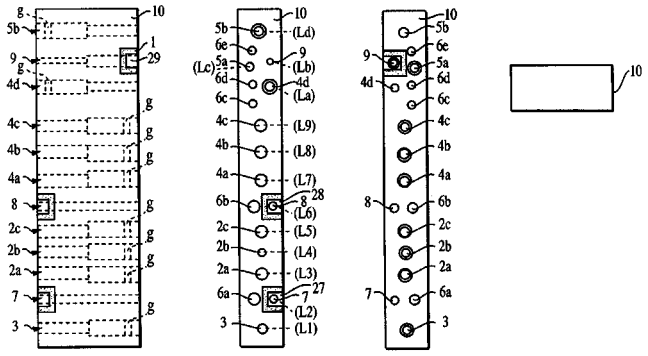
6,281,768 Aug. 28, 2001

Dielectric Filter, Duplexer, and Communication Apparatus

Inventors: Hitoshi Tada, Motoharu Hiroshima, and Hideyuki Kato.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Nov. 12, 1999.

***Abstract*—**There is disclosed a dielectric filter comprising: a plurality of resonant lines disposed in a dielectric block, in a dielectric substrate, or on a dielectric substrate; wherein the open ends of at least one adjacent pair of the resonant lines are oriented in the same direction to be combline-coupled, a first trap resonator resonant line and a signal inputting/outputting excitation line are each interdigitally coupled to one of the plurality of resonant lines, and a second trap-resonator resonant line is interdigitally coupled to the excitation line.

4 Claims, 9 Drawing Sheets



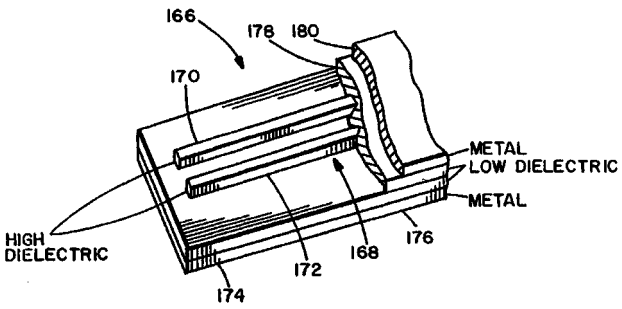
6,281,769 Aug. 28, 2001

Electromagnetic Transmission Line Elements Having a Boundary Between Materials of High and Low Dielectric Constants

Inventor: Slawomir J. Fiedziuszko
Assignee: Space Systems/Loral Inc.
Filed: Dec. 8, 1998.

***Abstract*—**An electromagnetic wave propagation structure, suitable for the transmission of an electromagnetic wave and the formation of resonators within filters, is constructed of both high and low dielectric-constant materials wherein the high dielectric-constant is in excess of approximately 80 and the low dielectric-constant is less than approximately 2. A boundary between the high and the low dielectric-constant materials serves as an electric wall to waves propagating in the low dielectric-constant material and as a magnetic wall to waves propagating in the high dielectric-constant material. This permits substitution of the high dielectric-constant material for metal elements, such as resonators and feed structures in filters. Furthermore, the use of a cladding of dielectric material of one of the foregoing dielectric ranges about a core of material of the other of the foregoing dielectric ranges enables construction of waveguides having rectangular and circular cross-sections. Microstrip and stripline structures with substitution of the high dielectric-constant material for the harmonic elements may also be constructed.

2 Claims, 5 Drawing Sheets



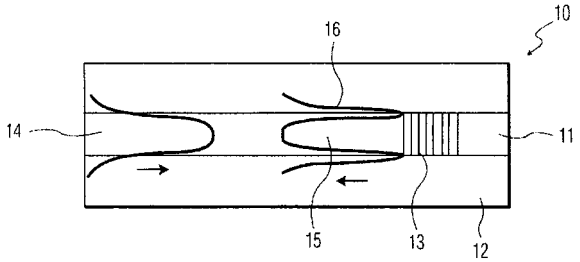
6,282,338 Aug. 28, 2001

Interfacial Propagating Mode Waveguide

Inventor: Claudio O. Egalon.
Assignee: Intelligent Optical Systems, Inc.
Filed: Feb. 1, 2000.

***Abstract*—**An optical fiber waveguide including a selected period reflection grating structure for coupling the forward propagating mode of an optical signal transmitted through the waveguide into a backward propagating interfacial mode where a substantial portion of the optical signal is propagated in the cladding region of the fiber.

8 Claims, 3 Drawing Sheets



6,282,341 Aug. 28, 2001

Tunable, Mechanically Induced Long-Period Fiber Grating With Enhanced Polarizing Characteristics

Inventors: Michel J. F. Digonnet, Silviu Savin, Gordon S. Kino, and H. John Shaw.
Assignee: The Board of Trustees of the Leland Stanford Junior University.
Filed: Dec. 21, 1999.

***Abstract*—**A new type of fiber filter is usable in optical communication systems. In particular, the fiber filter may be used to flatten the gain of erbium-doped fiber amplifiers (EDFAs). Such gain flattening is important for long-

haul, dense (wavelength dependent multiplexed) WDM communication systems. The filter includes a periodic mechanical structure pressed against the side of a single-mode fiber to induce a wavelength-dependent loss in a signal propagating in the fiber core by coupling the signal to fiber cladding modes. The mechanical structure is a periodic comb of small ridges. Each ridge induces a local index change in the fiber via the photoelastic effect. For coupling to the right cladding modes, the period of the grating (and the comb) is in the range of few hundreds of microns. Thus, the grating is easy to fabricate with standard machining equipment.

95 Claims, 16 Drawing Sheets